State Of California The Resources Agency of California

Memorandum

Date: April 28, 1999
Telephone: (916) 653-0159

To: Commissioner Robert A. Laurie
Commissioner David A. Rohy

File: fsasup4.doc

From: **California Energy Commission** - Marc Pryor
1516 Ninth Street Project Manager
Sacramento, CA 95814-5512

Subject: **Revised Testimony to the La Paloma Generating Project (98-AFC-2) Final Staff Assessment**

On April 7, 1999, the California Energy Commission (Energy Commission) staff filed its Final Staff Assessment (FSA) for the La Paloma Generating Project, a 1,048 megawatt natural gas-fired power plant to be located in western Kern County, California. As noted in the FSA, the air quality, biological resources, water resources, paleontological resources and cultural resources technical areas were incomplete due to a lack of timely information. At the hearings on April 21 and 22, 1999, the committee issued an order to staff to revise its Waste Management conditions, and the Noise and Hazardous Materials Handling sections of the FSA.

Attached are the revised testimonies.

SUMMARY OF THE REVISED DOCUMENTS

WASTE MANAGEMENT

Conditions WASTE-4 and WASTE-5 were added. Respectively, these address an unexpected facility closure and mitigation measure bullet five (page 109 of the FSA).

NOISE

Information was added to condition NOISE-6 and NOISE-8 was rewritten to eliminate the term “noisy”, while making the condition more clear. Other minor revisions were made to the overall document. Added text is shown underlined; deleted text is shown using strike outs.

HAZARDOUS MATERIALS HANDLING

Staff has revised its testimony to better address mitigation measures for 1) the accidental release of ammonia gas, 2) chlorine and hydrogen gas release, and 3) fire and explosion from the use of natural gas.

Attachment

cc: Proof of Service

WASTE MANAGEMENT

Supplemental Testimony of Ellie Townsend-Smith

INTRODUCTION

On April 21, 1999, the Energy Commission's committee assigned to the La Paloma Generating Project siting case (98-AFC-2) ordered staff to provide supplemental Waste Management testimony that addresses 1) unexpected facility closure, and 2) mitigation measures that were not conditioned in the Final Staff Assessment.

SUPPLEMENTAL PROPOSED CONDITIONS OF CERTIFICATION

WASTE-4: Prior to the commencement of commercial operation, the project owner shall submit to the CPM for review and approval a waste management plan for unexpected closure of the facility. The plan may be incorporated into the On-Site Contingency Plan(s).

Protocol: The waste management plan shall describe how all hazardous waste and non-hazardous waste will be removed from the site in accordance with all applicable LORS in the event of an unexpected permanent closure of the facility.

The waste management plan shall also describe how the hazardous waste (if allowed to remain on site longer than 90 days) will be secured and maintained safely for the period of closure, in the event of an unexpected temporary closure of the facility.

If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall submit to the CPM a revised plan.

Verification: At least 60 days prior to the commencement of commercial operation, the project owner shall submit the waste management plan for unexpected closure to the CPM for review and approval.

If the CPM notifies the [project owner that any revisions of the plan are needed before the CPM will approve the plan, the project owner shall submit to the CPM a revised plan within 30 days of receiving that notification.

WASTE-5: No hazardous waste will be stored on site longer than 90 days unless dictated by law, ordinances, regulations or standards (LORS).

Verification: The project owner shall indicate in the Annual Compliance Report which hazardous wastes are stored on the site longer than 90 days, and which LORS pertain.

NOISE

Revised Testimony of Kisabuli

INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night during which it is produced, and the proximity of the facility to any sensitive receptors combine to determine whether a proposed project ~~the La Paloma Generating Project (LPGP)~~ will meet applicable noise control laws and ordinances, and whether it will exhibit significant adverse environmental impacts.

The purpose of this analysis is to identify the likely noise impacts from the La Paloma Generating Project (LPGP); and to recommend conditions ~~procedures~~ to ensure that the resulting noise impacts will comply with applicable laws and ordinances, and will be adequately mitigated.

Before certifying the LPGP, the Energy Commission must find that the project:

1. ~~the LPGP~~ will likely be built and operated in compliance with all applicable noise laws, ordinances, regulations and standards; and

2. ~~the LPGP~~ will present no significant adverse noise impacts, or none that have not been mitigated to the extent feasible.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USCA § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations (29 C.F.R. § 1910 et seq.) that establish maximum noise levels to which workers at a facility may be exposed. These OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time during which the worker is exposed. (Please see **Noise: Appendix A, Table A4** immediately following this section.) OSHA regulations also dictate hearing conservation program requirements and workplace noise monitoring requirements.

There are no federal laws governing offsite (community) noise.

STATE

Similarly, there are no state regulations governing offsite (community) noise. Rather, state-planning law (Gov. Code, § 65302) requires that local authorities such as counties or cities prepare and adopt a general plan. Government Code section 65302(g) requires that a noise element be prepared as part of the general plan to establish acceptable noise limits. Other state LORS include CEQA and Cal-OSHA.

The California Occupational Safety and Health Administration (Cal-OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, § 5095 et seq.) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards described above.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified, and that such impacts be eliminated or mitigated to the extent feasible. The CEQA Guidelines (Cal. Code Regs., tit. 14, Appendix G) explain that a significant effect from noise may exist if a project would result in:

1. "Exposure of persons to, or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

2. "Exposure of persons to, or generation of excessive ground vibration or ground-borne noise levels.

3. "A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4. "A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project."

LOCAL

KERN COUNTY GENERAL PLAN - NOISE ELEMENT

Kern County has established environmental noise limits based on the land use of the property receiving the noise. The permissible noise levels are outlined below.

NOISE: Table 1
Kern County General Plan-Noise Element

Land Use Category	Maximum Permissible Sound Level		
	L_{50} (Day)	L_{50} (Night)	L_{dn} (CNEL)
Non-sensitive Land Uses	65	60	75
Moderately Sensitive Land Uses	60	55	70
Sensitive Land Uses	55	45	65
Highly Sensitive Land Uses	50	40	60

The nearest noise sensitive receptors to the LPGP site include residences within McKittrick. According to the Kern County Noise Element, these single-family rural dwellings would be classified as Highly Sensitive Land Uses. As such, the maximum allowable noise level from the LPGP at the residential properties is the L_{50} (Night) of 40 dBA.

SETTING

The proposed LPGP site is located within the McKittrick Valley, approximately ~~8,000~~ 10,000 feet (1.9 miles) east of the community of McKittrick. The closest residence to the facility is located within McKittrick. The LPGP site is located in a rural setting, surrounded by open lands containing scattered oil wells, pipelines, compressors and tanks.

The existing ambient noise environment is very quiet in nature. The primary ambient noise sources are local traffic along Route 33, occasional local traffic along Skyline Road, and the background noise from the oil field equipment.

AMBIENT NOISE SURVEY

A noise survey was conducted, by the applicant, to assess the existing ambient noise conditions at the site and surrounding community. The ambient noise survey was conducted from Monday, May 4 through Wednesday, May 6, 1998.

Continuous noise measurements were recorded at three locations (LPGP 1998a, AFC page 5.12-2 and Figure 5.12-1). Location 1 is at the southwest corner of the LPGP site. Location 2 is at the northeast corner of the LPGP site. Location 3 is in McKittrick at the nearest residence to the LPGP site. Intermittent measurements were also recorded at each of these three locations.

The continuous measured noise levels are included in Tables 5.12-1 through 5.12-3 for locations 1 through 3, respectively (LPGP 1998a, AFC pages 5.12-5 through 5.12-7). The intermittent noise measurements are included in Table 5.12-4 (LPGP 1998a, AFC page 5.12-8).

Sound levels at each of the three locations were very low at night. The residual (L_{90}) or background noise levels ranged from 34 to 43 dBA during the nighttime hours. The only audible noise sources were occasional traffic along Route 33 and noise generated by the existing oil wells and other associated equipment.

The following is a summary of the 24-hour average levels recorded at measurement locations 1 through 3 (LPGP 1998a, AFC page 5.12-8):

Noise: Table 2
Summary of 24-hour Average Noise Levels

Location	L_{dn}	CNEL	$L_{eq}(24)$
Location 1 (Site)	53.7	53.8	51.1
Location 2 (Site)	55.4	55.4	50.1
Location 3 (Residence)	49.2	49.4	42.7

~~The closest residence to the facility is located on the east side of McKittrick, approximately 8,000 feet west of the site.~~ The residences within McKittrick have a direct line-of-sight to the proposed facility location. The next closest residences are located in the community of Derby Acres, approximately 16,000 feet to the south. The residences

of this town are located more than three miles from the site and there are interceding hills, which block any direct line-of-sight. Therefore, the residences of Derby Acres are not expected to be impacted by the noise from the LPGP.

NOISE IMPACTS

LPGP noise impacts can be created by construction and by normal operation of the power plant.

CONSTRUCTION NOISE IMPACTS

Construction of the LPGP is scheduled to last about 24 months (LPGP 1998a, AFC page 1-2), with varying degrees of activity occurring, during the different phases of construction. Construction phases include: 1) excavation; 2) concrete pouring; 3) steel erection; 4) mechanical component installation; and 5) clean up. Construction noise impacts should be typical of powerplant construction activities. Major noise sources associated with most large industrial construction include: air compressors, track hoes, backhoes, graders, bulldozers, scrapers, front-end loaders, cranes, generators, boom tracks and the various trucks and smaller vehicles. The exact noise levels are a complex function of the actual noise levels emitted from each major noise-emitting piece of equipment, and their relative location and orientation within the construction area. To estimate the plant construction noise impacts, the composite noise levels listed in Table 3 below are used.

Noise: Table 3
Construction equipment and composite site noise levels.

Construction Phase	Noise Construction Equipment	Equipment Noise Level (dBA)	Composite Site Noise Level @ 50 ft. (dBA)
Excavation	Pile driver Dump truck Rock drill	101 91 98	89
Concrete pouring	Truck Concrete mixer	91 85	78
Steel erection	Derrick crane Jack hammer	88 88	87
Mechanical	Derrick crane Pneumatic tools	88 86	87
Clean-up	Truck Steam blow unmuffled)	91 110 @ 1,000'	89

Source: EPA, 1971 and Barnes, 1976.

The composite noise levels are based on intensive noise monitoring during the construction of 15 actual power plants. The noise monitoring for the composite levels was done at locations selected to avoid undue excess attenuation from atmospheric conditions and terrain. The construction equipment were characterized as typical.

One important consideration in using these data is that the measurements are over 20 years old. Thus, they probably overestimate actual construction noise (there has been a trend towards quieter equipment in the intervening years). In spite of this consideration,

these data are comprehensive and have the advantage of integrating significant variability to arrive at an average impact from each phase of construction.

STEAM BLOWS

Typically, the loudest noise, inherent in the construction of all projects incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feedwater and steam systems, the piping and tubing that comprises the steam path has accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before connecting the steam system to the turbine, the steam line is temporarily routed to the atmosphere. Steam is then raised in the HRSG or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a steam blow, is quite effective at cleaning out the steam system piping. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam line is connected to the steam turbine, which is then ready for operation.

These steam blows can produce noise as loud as 130 dBA at a distance of 100 feet; this would attenuate to about 95 dBA at the nearest residence, exceedingly disturbing. Steam blow piping can be equipped with temporary silencers, which can reduce noise levels to ~~100~~ 110 dBA ~~or so~~ at 100 feet, or 65 to 70 dBA at the nearest residence. Staff recommends that such silencers be installed during steam blows (see proposed Condition of Certification **NOISE-4** below).

Alternatively, the project owner may elect to employ a new, quieter steam blow process, variously referred to as QuietBlow® or Silentsteam™. This method uses lower pressure steam over a continuous period of approximately 36 hours. Resulting noise levels reach only about 80 dBA at 100 feet, equivalent to 40 to 45 dBA at the nearest residence. This noise level complies with the Kern County noise element of the general plan. This relatively short-term impact should not significantly disrupt the project's neighbors. Staff proposes a notification process (see proposed Condition of Certification **NOISE-5** below) to make neighbors aware of impending steam blows, this should help render the process tolerable.

LINEAR FACILITIES

Construction of the water pipeline and transmission line will produce noise. This noise will be noticeable, and possibly annoying, to persons outside their homes at those residences nearest the construction. This work, however, is only a temporary phenomenon; the work will progress at such a pace that no single receptor will be inconvenienced for more than a few days. In addition, such work is customarily performed during the daytime, and would cause no impacts at night, when quiet is most important. While no LORS are in effect to assure daytime-only construction, staff has proposed a noise complaint process (see proposed Conditions of Certification **NOISE-1** and **NOISE-2**, below) that will allow any person suffering annoyance to address the

problem with the applicant. Staff has also proposed a Condition of Certification (**NOISE-8**, below) to restrict noisy construction work to the hours specified in the applicable LORS, above. Staff believes no significant adverse noise impacts are likely to occur due to construction of the linear facilities.

CUMULATIVE NOISE IMPACTS

There are no industrial developments planned in the vicinity of the project site during the construction period of the project. Therefore, construction noise impacts from the facility will not contribute significantly to cumulative noise impacts in the area.

COMMUNITY NOISE EXPOSURE

The approximate ~~8,000~~ 10,000 foot wide buffer zone to the nearest sensitive receptor will allow for significant attenuation of sound levels produced during the construction of the project and related facilities. Geometric or hemispherical spreading of the sound waves alone will reduce the sound levels by about 45 dBA at ~~8,000~~ 10,000 feet. Other attenuating mechanisms, such as atmospheric absorption and ground effects, will reduce the levels by another 15 to 25 dBA depending upon atmospheric conditions.

The composite noise levels in NOISE Table 3 were used to predict noise levels in the community of McKittrick, using simple spherical divergence of the sound wave energy from the reference distance of 50 feet. The results of this modeling approach indicate that construction noise is expected to range from 35 to 45 dBA. This noise level will barely be audible in the community of McKittrick.

These sound levels should occur primarily during the daytime hours. Based on these assessments, construction noise levels in this range are not anticipated to cause any disturbance to local residents.

WORKER NOISE EXPOSURE

A reference distance of 50 feet was used to evaluate on-site construction noise levels and their potential impacts on workers. ~~On-site noise levels were estimated using the approach described above.~~ The noise levels will vary significantly depending on whether a worker is closer to or conducting a noisy activity, but the L_{eq} levels are projected to average between 75 and 85 dBA during the first four phases of construction. Undoubtedly, some workers will be occasionally exposed to noise levels above 85 dBA during construction. The applicant recognizes the need to protect construction personnel from noise hazards (LPGP 1998a, AFC page 5.12-13, 5.12-18). The applicant predicts that construction noise levels (other than steam blows) will not reach levels that require worker protection, but will put in place a hearing conservation program for employees who may be exposed to high levels of noise. To ensure that workers are adequately protected, staff has proposed a condition of certification (see proposed Condition of Certification **NOISE-3**, below).

MITIGATION MEASURES

Due to the large buffer between the site and sensitive receptors, no noise mitigation will be required for normal plant construction activities. However, the steam blow activity conducted near the end of plant construction will require mitigation to avoid creating

significant noise impacts. A temporary silencer will be fitted to the steam blow discharge point to reduce noise levels by at least 20 dBA. Furthermore, the steam blow activity will only be conducted during normal daytime work hours. A public notification program which will alert area residents to the nature of the activity, expected sound levels and to the fact that it is a one-time operation and not a part of normal plant operations will be implemented. Staff concurs that these would constitute acceptable mitigation measures.

OPERATION NOISE IMPACTS

During its operating life, the project will represent essentially a steady, continuous noise source day and night. Occasional short-term increases in noise level will occur as steam relief valves open to vent pressure, or during startup or shutdown as the plant transitions to and from steady-state operation. At other times, such as when the plant is shut down for lack of dispatch or for maintenance, noise levels will decrease.

The applicant modeled facility noise emissions using predictive software. Noise modeling was conducted to predict the environmental noise emissions during normal, steady state conditions. The model simulates the outdoor propagation of sound from each point source and accounts for divergence, atmospheric sound absorption and sound attenuation. All equipment sound levels were based on standard manufacturer performance data or empirical formulae as outlined in the Electric Power Plant Environmental Noise Guide by Edison Electric Institute (1984).

The primary noise sources anticipated from the proposed facility include the heat recovery steam generators, the combustion turbine generator packages, the steam turbine generators, the cooling towers, the boiler feed pumps, the generator step-up transformers, and the circulating water pumps. Secondary noise sources are anticipated to include pumps, ventilation fans and compressors. The noise emitted by power plants during normal operations is generally broadband, steady state in nature.

The overall environmental noise emissions resulting from the facility during normal operation, with standard packaged equipment are depicted on Figure 5.12-2 (LPGP 1998a, AFC page 5.12-11).

LINEAR FACILITIES

The linear facilities, once placed in operation, will likely produce no audible noise. Project-related maintenance activities for the water pipeline could contribute briefly to the local noise environment; the effects, however, on the long-term acoustical environment will be minimal and insignificant. The electric transmission line will normally be inaudible from any distance beyond 100 feet from the wire bundle (LPGP 1998a, AFC page 5.12-16). A humming from corona effect would occur in rainy or highly humid conditions, but would be practically unnoticeable, masked by traffic sounds and other ambient noises.

CUMULATIVE IMPACTS

Requisites to the discussions of cumulative impacts are nearby projects existing or planned. Existing or planned projects in the vicinity of the LPGP include: Elk Hills Power Project (eight miles), Sunrise Cogeneration and Power Project (eight miles), Midway Sunset (six miles) and Pastoria Power Project (more than 20 miles). There are no

existing or planned projects within a two-mile radius of LPGP to result in cumulative noise impacts. Therefore, the ~~The~~ LPGP will not adversely impact or be adversely impacted by the noise from any adjacent existing or future development.~~, as no such development is foreseen~~. ~~Since the LPGP's noise emissions will be controlled to low levels in order to comply with LORS, they will likely be nearly unnoticeable.~~

COMMUNITY NOISE IMPACTS

The applicant commits to incorporating noise mitigation measures into the design of the project that will ensure that noise levels from the plant at the nearest receptor, the residences within McKittrick, will be ~~below~~ 40 dBA L_{50} or less (LPGP 1998a,~~-~~AFC § 5.12.2.1) under normal operating conditions. This remains valid in light of the addition of the fuel gas compressor (LPGP 1998g). Since 40 dBA L_{50} is such a low noise level, and in fact is quieter than the ambient noises typically encountered in the neighborhood of the project, staff agrees that this is a feasible approach to assuring project noise impacts do not exceed legal limits. ~~, and~~ This will likely not present a significant adverse noise impact to the community ~~upon sensitive receptors~~.

TONAL AND INTERMITTENT NOISES

One possible source of noise annoyance would be strong tonal noises, individual sounds that, while not louder than the permissible levels, stand out in sound quality. To ensure the avoidance of such tonal sound, the noise control design of the LPGP can be balanced to bring as many noise sources as possible to the same relative sound level, causing them all to blend without any one source standing out. Another potentially annoying source of noise from a combined cycle power plant is the intermittent or occasional actuation of steam relief valves. The hissing noise from these valves can be largely mitigated by the installation of adequate mufflers. To ensure that adequate measures are taken to mitigate tonal and intermittent noise sources, staff has proposed measures (see proposed Condition of Certification **NOISE-6**, below) to ensure that tonal and intermittent steam relief noises are not allowed to cause a problem.

WORKER NOISE EXPOSURE

The applicant ~~has~~ will identify~~ied~~ those locations in the plant and those pieces of equipment likely to produce hazardous noise levels (LPGP 1998a, AFC page 5.12-13), and has committed to complying with all applicable noise protection laws, regulations and requirements (LPGP 1998a, AFC page 5.12-18). Administrative procedures and hearing protection measures will be put in place to ensure workers' hearing is adequately protected. Staff has proposed ~~measures~~ conditions (see proposed Condition of Certification **NOISE-7**, below) to ensure compliance.

Compliance with OSHA noise exposure regulations could be achieved through selection of quiet equipment when available, monitoring to determine areas with high noise levels, marking of identified high noise level areas with signs and yellow painted stripes on the floor, implementation of a hearing conservation program for all employees that are likely to be exposed to noise levels exceeding 85 dBA over an 8-hour work day, provision of hearing protection devices and training on their use, and a requirement to wear hearing protection in designated high noise level areas.

MITIGATION MEASURES

The potential noise mitigation measures described by the applicant (LPGP 1998a, AFC page 5.12-8) are typical for such an application. They include (to be employed as required):

1. provide standard outdoor/weather enclosures for the combustion turbine generator packages;

2. provide air inlet silencers for the combustion turbines;

3. provide standard outdoor/weather enclosure for the steam turbine generator packages; and

4. install silencers for the heat recovery steam generator exhaust stacks.

These sorts of noise attenuation measures have been employed for years on similar facilities, and their noise control abilities are well known. Staff has proposed measures (see proposed Condition of Certification **NOISE-6** below) to ensure that these noise mitigation measures are carried out, and that they are effective.

The only strong tonal frequency identified is from transformers. The highest tonal component level is estimated at 37 dB. Adding a 5-dB penalty to the overall 37-dB level yields a "weighted" level of only 42 dB. This is less than significant sound for any noise sensitive use. To ensure this, staff has proposed measures (see proposed Condition of Certification **NOISE-6**, below) to ensure that tonal noises are not allowed to cause a problem.

FACILITY CLOSURE

Upon closure of the facility, all operational noise will cease; no further adverse impacts from operation will be possible. The remaining potential noise source will be that caused by dismantling of the structures and equipment, and any site restoration work that may be performed. Since this noise will be similar to that caused by the original construction of the LPGP, it can be treated similarly. That is, noisy work can be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS then in existence would apply; applicable Conditions of Certification included in the Energy Commission Decision would also apply unless properly modified.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff concludes that the LPGP will likely be built and operated to comply with all applicable noise laws, ordinances, regulations and standards. Staff further concludes that the LPGP will likely present no significant adverse noise impacts. The LPGP will likely represent an unobtrusive, nearly undetectable addition to existing noise levels.

RECOMMENDATIONS

Staff recommends the following:

The applicant shall conduct two (2) occupational noise surveys, one during plant construction and the second during plant operation. The operational noise survey shall be conducted only after the facility has achieved at least 80% of the plant rated output capacity, but no later than 30 days after the plant reaches 80% of its rated capacity. Both surveys should attempt to verify that workers are not exposed to noise intensities exceeding those identified by Cal OSHA.

If such exposures are found to occur, the applicant shall implement, at a minimum, the following:

1. Place signs in conspicuous locations clearly warning employees that: (a) specified areas are in excess of the Cal OSHA noise standards; and (b) access to such areas shall be limited only to workers that are using proper hearing protective devices.

2. Train personnel in the proper use of individual hearing protective devices, the training to be provided by a person familiar with the use and care of such devices.

3. As needed, employ engineering and administrative controls to reduce employee exposure to noise.

4. Employ an acoustical specialist to participate in the design, procurement and installation phases of the LPGP in order to assure that the LPGP will comply with Cal-OSHA.

Community

~~5.~~1 Conduct an ambient noise survey to confirm that the operational noise levels of the LPGP are within the estimated levels as provided in the application for all the sensitive receptors, and to verify that no new pure-tone components are introduced.

~~6.~~2 Employ the noise complaint resolution procedure that has been filed as part of the application in order to document all the noise complaints.

PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 At least 15 days prior to the start of rough grading, the project owner shall notify all residents within McKittrick, by mail or other effective means, of the commencement of LPGP construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the LPGP. If the telephone is not staffed

24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the LPGP site during construction in a manner visible to passersby. This telephone number shall be maintained until the LPGP has been operational for at least one year.

Verification: The project owner shall transmit to the CPM in the first Monthly Construction Report following the start of rough grading a statement, signed by the project manager, attesting that the above notification has been performed, and describing the method of that notification. This statement shall also attest that the telephone number has been established and posted at the site.

NOISE-2 Throughout the construction and operation of the LPGP, the project owner shall document, investigate, evaluate, and attempt to resolve all project related noise complaints.

Protocol: The project owner ~~or authorized agent~~ shall:

1. use the Noise Complaint Resolution Form (see below for example), or functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;

2. attempt to contact the person(s) making the noise complaint within 24 hours;

3. conduct an investigation to determine the source of noise related to the complaint;

4. if the noise is project related, take all feasible measures to reduce the noise at its source; and

5. submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts; and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to complainant's satisfaction.

Verification: Within 30 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form, or similar instrument approved by the CPM, with Kern County and with the CPM documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 30-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is finally implemented.

NOISE COMPLAINT RESOLUTION FORM

La Paloma Generating Project
(98-AFC-2)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet: _____dBA Date: _____
Initial noise levels at complainant's property: _____dBA Date: _____

Final noise levels at 3 feet: _____dBA Date: _____
Final noise levels at complainant's property: _____dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: _____

(Attach additional pages and supporting documentation, as required.

NOISE-3 Prior to the start of LPGP construction, the project owner shall submit to the CPM for review a noise control program. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA standards.

Verification: At least 30 days prior to the start of rough grading, the project owner shall submit to the CPM the above referenced program. The project owner shall make the program available to OSHA upon request.

NOISE-4 If a traditional, high-pressure steam blow process is employed, the project owner shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 110 ~~100~~ dBA L_{50} measured at a distance of 100 feet. The project owner shall conduct steam blows only during the hours of 7:00 a.m. to 7:00 p.m. weekdays, and 8:00 a.m. to 6:00 p.m. weekends and holidays. If a modern, low-pressure continuous steam blow process is employed, the project owner shall submit a description of this process, with expected noise levels and projected hours of execution, to the CPM.

Verification: At least 15 days prior to the first high-pressure steam blow, the project owner shall submit to the CPM drawings or other information describing the temporary steam blow silencer, and a description of the steam blow schedule. At least 15 days prior to the first low-pressure continuous steam blow, the project owner shall submit to the CPM drawings or other information describing the process, including the noise levels expected and the expected time schedule for execution of the process.

NOISE-5 The project owner shall conduct a public notification program to alert residents within one mile of the site and the residents of McKittrick prior to the start of steam blow activities. The notification shall include a description of the purpose and nature of the steam blow(s), the proposed schedule, the expected sound levels and the explanation that it is a one-time operation and not a part of normal plant operations.

Verification: At least 15 days prior to the first steam blow(s), the project owner shall notify all residents within one mile of the site and all residents of McKittrick of the planned steam blow activity, and shall make the notification available to other area residents in an appropriate manner. The notification may be in the form of letters to the area residences, telephone calls, fliers or other effective means. Within five (5) days of notifying these entities, the project owner shall send a letter to the CPM confirming that they have been notified of the planned steam blow activities, including a description of the method(s) of that notification.

NOISE-6 Upon the LPGP first achieving an output of 80 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey, utilizing the same monitoring sites employed in the pre-project

ambient noise survey as a minimum. The survey shall also include the octave band pressure levels to ensure that no new pure-tone noise components have been introduced. No single piece of equipment shall be allowed to stand out as a dominant source of noise that draws complaints. Steam relief valves shall be adequately muffled to preclude noise that draws complaints. The noise contributed by the LPGP operations at the nearest residence in McKittrick shall not exceed 40 dBA L_{50} under normal operating conditions. If the results from the survey indicate that ~~operation of the~~ power plant ~~causes~~ noise levels are in excess of 40 dBA L_{50} ~~(L_{eq}) measured~~ at the nearest residence, additional mitigation measures shall be implemented to reduce noise to a level of compliance with this limit. The mitigation measures (to be employed as required) include, but not limited to:

1. provide standard outdoor/weather enclosures for the combustion turbine generator packages;

2. provide air inlet silencers for the combustion turbines;

3. provide standard outdoor/weather enclosure for the steam turbine generator packages; and

4. install silencers for the heat recovery steam generator exhaust stacks.

Protocol: The measurement of power plant noise for purposes of demonstrating compliance with this Condition may alternatively be made at an acceptable location closer to the plant (e.g. 400 to 1,000 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the nearest sensitive receptor in McKittrick. However, not withstanding the use of this alternative method for determining the noise level, the character of plant noise shall be evaluated at the nearest sensitive receptor to determine the presence of pure tones or other dominant sources of plant noise.

Verification: Within 30 days after first achieving an output of 80 percent or greater of rated output, the project owner shall conduct the above described noise survey. Within 30 days after completing the survey, the project owner shall submit a summary report of the survey to Kern County and the CPM. Included in the report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. Within 30 days of completion of installation of these measures, the project owner shall submit to the CPM a summary report of a new noise survey, performed as described above and showing compliance with this condition.

NOISE-7 The project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility. The survey shall be conducted within thirty (30) days after the facility is operating at an output of 80% of rated capacity or greater, and shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095-5100 (Article 105) and Title 29, Code of Federal Regulations, Part 1910. The survey results shall be used to determine the magnitude of employee noise exposure. The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA upon request.

NOISE-8 In order to avoid adverse noise effects, ~~comply with the community noise equivalent level (CNEL),~~ any construction activity such as pile driving, excavation and grading (earth movement), concrete pour and steel erection) ~~noisy construction work~~ shall be restricted to the hours of: 7 a.m. to 7 p.m. on weekdays and from 8 a.m. to 6 p.m. on weekends and holidays.

Verification: The project owner shall transmit to the CPM in the first Monthly Construction Report a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

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NOISE: APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

Noise levels can be measured in a number of ways. One common measurement, the equivalent sound level (L_{eq}), is the long-term A-weighted sound level that is equal to the level of a steady-state condition having the same energy as the time-varying noise, for a given situation and time period. (See NOISE: Table A1, below.) A day-night (L_{dn}) sound level measurement is similar to L_{eq}, but has a 10 dB weighting added to the night portion of the noise because noise during night time hours is considered more annoying than the same noise during the day.

NOISE Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dB	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level L_{eq}	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels to levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn}	The Average A-Weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Source: California Department of Health Services 1976.	

In order to help the reader understand the concept of noise in decibels (dBA), NOISE: Table A2 has been provided to illustrate common noises and their associated dBA levels.

NOISE Table A2
Typical Environmental and Industry Sound Levels

Source and Given Distance from that Source	A-Weighted Sound Level in Decibels (dBA)	Environmental Noise	Subjectivity/ Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		
	110	Rock Music Concert	Very Loud
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')			
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	Quiet
Large Transformer (200')	40		
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		

Source: Peterson and Gross 1974

SUBJECTIVE RESPONSE TO NOISE

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise

effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships (Kryter 1970) can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of one dB cannot be perceived.

2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.

3. A change in level of at least five dB is required before any noticeable change in community response would be expected.

4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

COMBINATION OF SOUND LEVELS

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a three dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus three dB). The rules for decibel addition used in community noise prediction are:

NOISE Table A3
Addition of Decibel Values

When two decibel Values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Thumann, Table 2.3

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

NOISE Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: OSHA Regulations

HAZARDOUS MATERIALS MANAGEMENT

Revised Testimony of Joseph M. Loyer

INTRODUCTION

The purpose of this analysis is to determine if the proposed La Paloma Generating Project (LPGP) will have a significant impact on the health and safety of the general public as a result of the handling or storage of hazardous materials at the facility. The scope of this analysis will include a determination of the project's ability to satisfy the applicable laws, ordinances, regulations and standards (LORS) after certification has been granted. This analysis goes beyond these reasonable assurances to comply with LORS in determining if there will likely be significant adverse impacts to the general public, pursuant to the Energy Commission responsibilities under the California Environmental Quality Act, 1993 (CEQA). If significant adverse impacts are identified, the Energy Commission staff will evaluate the potential for facility design alternatives or mitigation measures to reduce impacts to the extent feasible, as required pursuant to Title 20, California Code of Regulations, section 1742.5(a). The closely related issues of hazardous waste removal and worker safety are addressed in the areas of **Waste Management** and **Worker Safety and Fire Protection**. Also, the issue of transporting hazardous materials is handled in the **Traffic and Transportation** portion of this staff assessment.

APPLICABLE LAWS, ORDINANCES, REGULATIONS, STANDARDS AND POLICIES

FEDERAL

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III and Clean Air Act of 1990 established a nationwide emergency planning and response program and imposed reporting requirements for businesses which store, handle, or produce significant quantities of hazardous or acutely hazardous substances. The Acts (implemented in 40 CFR § 68.115) require the states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of these Acts, as well as additional requirements for handling and storage of acutely hazardous substances, are reflected in the California Health and Safety Code, section 25520 et seq.

STATE

HEALTH AND SAFETY CODE

CALIFORNIA HEALTH AND SAFETY CODE, SECTION 25500

This requires companies that handle hazardous materials in sufficient quantities to develop a Business Plan. The Business Plan must include:

- the basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidentally released into the environment;

- a plan for training new personnel and for annual training of all personnel in safety procedures to follow in the event of a release of hazardous materials; and

- an emergency response plan and the identity of the business representative able to assist emergency personnel in the event of a release.

CALIFORNIA HEALTH AND SAFETY CODE, SECTION 25531

This directs facilities handling hazardous materials in sufficient quantities to develop a Risk Management Plan (RMP) and submit it to appropriate local authorities and the United States Environmental Protection Agency (EPA) for review and approval. The plan must identify:

- the severity of an accidental release;
- the likelihood of an accidental release occurring;
- the magnitude of potential human exposure;
- any pre-existing evaluations or studies of the material;
- the likelihood of the substance being handled in the manner indicated; and
- the accident history of the material.

This new program supersedes the California Risk Management and Prevention Plan (RMPP).

CODE OF REGULATIONS

Title 8, California Code of Regulations, Chapter 4, in part, describes the design requirements for the various storage tanks proposed by the applicant. These regulations are primarily designed to protect the on-site workers, but they protect the general public as well. While they are too voluminous to describe in detail here, the regulations generally require the applicant to design tanks to the American Society of Mechanical Engineers (ASME) coded standards.

CALIFORNIA BUILDING CODE

The California Building Code (CBC) contains requirements regarding the storage and handling of hazardous materials, in a Seismic Zone 4 area, which restrict the issuance of an occupancy permit until the applicant has demonstrated compliance with section 307.1.6 of the CBC. That section requires a Hazardous Materials Management Plan be completed, which is similar in some respects to the RMP. The proposed project site is in a Seismic Zone 4 area.

LOCAL AND REGIONAL

The Uniform Fire Code (UFC) contains provisions regarding the storage and handling of hazardous materials. These provisions are contained in Articles 79 and 80. Article 80 was extensively revised in the latest edition. These articles contain requirements that are generally similar to those contained in Health & Safety Code

section 25531 et seq. The UFC does, however, contain unique requirements for secondary containment, monitoring, and treatment of toxic gases emitted through emergency venting. These unique requirements are generally restricted to extremely hazardous materials.

ENVIRONMENTAL SETTING

SITE AND VICINITY DESCRIPTION

The LPGP will be located in western Kern County about 40 miles from Bakersfield, California. The 23-acre site is located near the intersection of Skyline and Reserve Roads, approximately 1.5 miles east of McKittrick. Several factors associated with the location of the project affect its potential for causing public health impacts. These include:

- the local meteorology;
- terrain characteristics;
- special location considerations; and
- the location of population centers and sensitive receptors relative to the project.

Staff considered these factors in assessing the potential impacts to the public, which may occur in the event of an accidental release of hazardous material from the facility. The following sections describe the local conditions affecting public exposure in the area surrounding the proposed project.

METEOROLOGICAL CONDITIONS

Wind speed, wind direction and air temperature affect the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the level of public exposure to such materials and the associated health impacts. When wind speeds are low and stable, dispersion is minimized and can lead to significant health impacts to those exposed.

Recorded wind speeds and ambient air temperatures are discussed in the application (LPGP 1998a, AFC section 5.15-10). This data indicates that the predominant winds are from the southwest and have an E classification (slightly stable, from 4.6 to 6.9 mph), but can range up to D classification (neutral, 8.06 to 11.52 mph). Less frequent winds from the northwest occur under unstable situations. Local ambient air temperatures range from 15 to 115^{o}F, with an annual average of 65^{o}F.

TERRAIN CHARACTERISTICS

The location of elevated terrain (terrain above the stack height) is often an important factor to be considered in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. There is elevated terrain to the southwest within 10 miles of the project site (see LPGP 1998a, AFC Figure 5.2-5). However, these elevated terrain

areas are sparsely populated and are a significant distance from the project site, so they are not considered in the impacts modeling analysis.

SPECIAL LOCATION CONSIDERATIONS

The site is located in a CBC Seismic Zone 4 area, the zone of greatest potential shaking. The project will be designed to Seismic Zone 4 requirements or greater.

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general public includes many sensitive subgroups that may be at greater risk from exposure to hazardous materials. These sensitive subgroups include the very young, the elderly, and those with existing illnesses (Calabrese 1978). Also, the location of the general public in the area surrounding a project site may have a large bearing on exposure risk. Figure 5.15-8 (LPGP 1998a, AFC, page 5.15-19, 20) shows the locations of both the general public and sensitive subgroups in the project vicinity.

HAZARDOUS MATERIALS

The following hazardous materials, which are to be used at the facility, have a potential to impact the general public:

- sodium hypochlorite;
- sulfuric acid;
- aqueous ammonia; and
- natural gas.

The accidental release or mixing of the substances listed above can result in the release of a toxic or explosive gas. Sodium hypochlorite and sulfuric acid react and can produce chlorine gas. Sulfuric acid reacts with most metals to release hydrogen gas, which is explosive in air. The use of aqueous ammonia can result in the release of ammonia gas in the event of a spill, due to its relatively high vapor pressure. The use of natural gas can result in fires and/or explosions.

Other hazardous materials, such as scale inhibitors (phosphate), oxygen scavengers, neutralizing amine, biocides, settling aids, drainage aids, water softening and de-chlorinators, will be present at the proposed facility. However, these materials pose minimal potential for off-site impacts, as they will be stored in small quantities. A complete list of these materials is provided in Appendix B.

The typical methods used, in order of preference, to avoid or minimize impacts from the accidental releases of hazardous materials are as follows:

- use of non-hazardous or less hazardous materials;
- use of engineered controls;
- use of administrative controls; and
- emergency response planning.

IMPACTS

Staff has identified three major types of hazards associated with the proposed project:

- accidental release of ammonia gas;
- chlorine and hydrogen gas release; and
- fire and explosion from the use of natural gas.

As discussed below, the release of ammonia is, in staff's opinion, the most likely accident to occur at the facility with the potential for off-site impacts that should be modeled. It is staff's opinion that the release of hydrogen or chlorine gas, or explosion from natural gas, are extremely unlikely events and that modeling them would not provide additional useful information.

ACCIDENTAL RELEASE OF AMMONIA GAS

DELIVERY AND STORAGE OF AQUEOUS AMMONIA

The applicant has proposed the use of aqueous ammonia instead of the much more hazardous anhydrous ammonia. The use of aqueous ammonia results in a substantial risk reduction in that anhydrous ammonia is a gas at ambient conditions, while aqueous ammonia is not. However, the accidental release of aqueous ammonia can result in the emission of ammonia gas from the liquid upon loss of containment. This is the result of the relatively high vapor pressure of aqueous ammonia under ambient conditions which may exist at the time of release. Therefore, under certain conditions, an aqueous ammonia spill can cause significant impacts on public health and safety.

The applicant has submitted additional design specifications for the aqueous ammonia storage facility in an addendum to the AFC (LGPG 1998a, Addendum VI). The proposed aqueous ammonia storage facility will comply with CBC Seismic Zone 4 requirements, in addition to hazardous material storage requirements. The proposed facility will consist of a delivery truck bay and an ammonia storage building. The delivery truck bay will be open on three sides with a roof covering it. The floor will be sub graded and sloped towards the ammonia storage building. The tank storage building will include drains at the truck bay so that any ammonia or water spilled in the truck bay will drain into the ammonia storage building. An automated spill sensor and water sprinkler system will be incorporated into the roof of the truck bay to wash down any spills in the truck bay.

The tank storage building will have three or four 13,280-gallon, vertically mounted, aqueous ammonia storage tanks designed to Seismic Zone 4 specifications. The building will include a sub graded area that will have a capacity of 30,000 gallons (for three tanks) or 34,500 gallons (for four tanks) to provide overfill, truck bay spillage and tank rupture protection. The building will enclose the tanks on all four sides, as well as the necessary pumps for loading and handling the aqueous ammonia. The building will also include roof vents and air intake vents (located near ground level along the back wall), as well as a separate electrical control room.

An automated spill sensor system will trigger all vents in the building to close, effectively reducing the ammonia emissions during an accidental spill to zero. Figure 1-1 of the addendum from applicant shows the layout and dimensions of the four tank design option (LPGP 1998a, Addendum VI).

The applicant will develop an emergency response plan, in conjunction with the Kern County Fire Department, that will incorporate appropriate actions to take in the case of an aqueous ammonia spill of any kind (LPGP 1998a, AFC, page 5.15-23).

AQUEOUS AMMONIA RELEASE SCENARIOS

Several release scenarios were analyzed by the applicant to identify and mitigate to the extent feasible any significant risks to public health and safety. These scenarios are not intended to be inclusive of all possible accidents, but instead represent those accidents that are reasonably foreseeable. Each scenario is evaluated for its probability of occurrence and significance of impact. If a scenario is a probable event and will result in a significant impact, then those impacts will be mitigated to the extent feasible.

Aqueous Ammonia Transfer Release Scenario

Staff believes that the most likely scenario resulting in a significant impact to public health and safety would involve human errors during the process of transferring aqueous ammonia from the delivery truck to the storage tanks. These errors could result in the loss of all of the delivered material (approximately 8,000 gallons). However, in the event of a loss of this nature in the truck bay, the entire spill would drain by gravity into the tank storage building. Even assuming that the automated sprinkler system failed, the ammonia emissions while draining into the building would be so small that staff assumed it to be zero.

Aqueous Ammonia Storage Tank Release Scenario

The proposed tank storage building protects the aqueous ammonia storage tanks against environmental elements (rain, wind and sun) and vehicular traffic. The applicant is proposing to use three or four tanks (as opposed to one) to store the aqueous ammonia on site. That will provide a maximum design capacity of 53,120 gallons, while the sub-graded retention pit has a maximum design capacity of 34,500 gallons to handle the loss of only two tanks. Staff finds this acceptable given the remote probability of multiple tank ruptures. There is a small probability that the tanks could fail under inappropriate use (over drawing the tanks) or even normal use (design failure). Staff has not been able to determine an appropriate failure rate for tanks due to the lack of relevant information. However, the probability of three or four tanks failing at the same time would be the probability of one tank raised to the third or fourth power. For example, if the probability of failure of one tank is 1:1,000 (which is far too large a value) then the probability for three tanks to fail at the same time is 1:1,000,000,000. This is a *de minimus* level and can be disregarded.

Aqueous Ammonia Release Scenario-- Modeling

The applicant used the following staff-recommended, short-term (30 minutes) exposure levels for modeling the off-site impacts of an accidental release of aqueous ammonia. They are: 1) lethality (2,000 parts per million (ppm)), 2) immediately dangerous to life and health (300 ppm), 3) the RMP endpoint required by EPA (200 ppm), and 4) a level considered to be without serious adverse effects on the public (75 ppm). An explanation of the exposure levels considered by staff and their applicability for use in modeling the accidental release of ammonia can be found in Appendix A. Staff also recommended that the nearest public receptor (a member of the general public) be assumed to be at the nearest residence, which is approximately 1.5 miles west of the facility site.

The applicant has modeled the accidental release of aqueous ammonia during delivery and from the catastrophic failure of at least one API storage tank as equivalent, using the following assumptions (LPGP 1998a, Addendum VI):

- the ambient air temperature is assumed to be 115oF;
- the wind stability is assumed to be F (stagnation);
- wind speeds are assumed to be between 1 and 1.5 meters per second;
- there is no plume rise, because there is no forced ventilation and the building air temperature is assumed to be equal to the ambient air temperature;
- the released amount is assumed to be 13,280 gallons, which represents the loss of one API tank; and
- the automated systems of the truck bay and ammonia storage building fail (no additional water from the sprinklers in the truck bay, and the vents on the building remain open).

The EPA-recommended emission rate equation relates the emission rate of ammonia to the ambient air temperature, ambient wind speed, molecular weight of ammonia, surface area of the pool and the vapor pressure of ammonia. In this equation (see below) the ambient wind speed and the surface area of the pool directly affect the emission rate. Reducing either term will reduce the emission rate of ammonia.

$$E = 6.94 \times 10^{-7} (1 + 0.0043(T_a - 273.15)^2)\, u_r^{0.78}\, A_p\, M\, (p_v/p_{vh})$$

Where: E = emission rate (kg/s)
ur = wind speed (m/s)
Ta = Ambient temperature (oK)
Ap = surface pool area (m2)
M = molecular weight (kg/kgmol)
Pv = vapor pressure of ammonia (Pa)
Pvh = vapor pressure of hydrazine at Ta (Pa)

This equation assumes that the pool in question is open to the ambient air. In the proposed aqueous ammonia storage facility, the pool is protected from the ambient air (i.e., the wind speed inside the building is effectively zero). However, the EPA guidance is to assume a mitigation factor of 10% on emission predictions using wind speed of 1.5 m/s for indoor pools. The applicant assumed a 12% mitigation factor for simplicity and added conservatism. Using these assumptions results in an indoor wind speed of 0.1 m/s.

The surface area of the pool is discounted due to the presence of the tanks. The total surface area of the basin is 154.77 m^2; the surface area of the tanks (four-4 m diameter tanks) is 50.27 m^2. The resulting effective surface area of the pool is 104.5 m^2.

The molecular weight of ammonia is 17 kg/kgmol, the vapor pressure of ammonia is 213,039 Pa and the vapor pressure of hydrazine is 6,204 Pa. These input values result in an emission rate of 69.8 g/s. Staff agrees with the applicant in characterizing this emission rate as conservative for the proposed ammonia storage facility.

Haz-Mat Table 1 shows the results of the SCREEN modeling analysis the applicant performed using the above emission factor. The applicant modeled several air temperatures, wind speeds and stability classes. The combination that produced the most significant results was 115 ^oF ambient air temperature, 1 m/s wind speed and F stability class (stagnation). According to figure 3.5-1 (LPGP 1998a, AFC page 3.5-6) the aqueous ammonia storage facility was to be located towards the southeastern corner of the facility. The closest property fence line is 13 meters away; the farthest is 198 meters. The nearest resident is located 2,496 meters towards McKittrick (west of the facility). Therefore, while the 300 ppm, 200 ppm and 75 ppm exposure levels are located off the property, they do not impact the nearest residence. Based on this analysis staff concludes that such an accidental release of aqueous ammonia will not cause a significant impact to public health and safety.

HAZ MAT TABLE 1
Results of Modeled Aqueous Ammonia Release

Recommended Exposure Levels for modeling off-site impacts of accidental ammonia spills	Distance (meters)	Specific Landmarks
2,000 ppm lethality →	-0- not detected beyond the aqueous ammonia storage facility	
	198	←Fence line, farthest from the aqueous ammonia storage facility
300 ppm IDLH →	241.2	
200 ppm RMP end point →	356.0	
75 ppm CEC Recommended →	822.6	
	2,496	← Nearest residence to the proposed power plant.

CHLORINE AND HYDROGEN GAS RELEASE

Sodium hypochlorite and sulfuric acid will be used to treat the cooling tower water for biological agents, water neutralization and pH level control. The mixture of sodium hypochlorite and sulfuric acid can result in the release of chlorine gas, which is extremely hazardous (CEC 1993). Sulfuric acid reacts with metals to form hydrogen gas, which is explosive in air.

Sodium hypochlorite will be used to treat water to control the growth of algae and other biological agents and to control pH. Staff supports the use of this material in that it poses much less risk than use of anhydrous chlorine, which is more commonly used for this purpose. Sulfuric acid will be used to control pH levels in the cooling tower and feed water.

Sodium hypochlorite will be stored in a 5,000-gallon plastic, above ground, vertically mounted storage tank, with a secondary containment wall surrounding it that is capable of holding the full contents of the tank plus 10%. The sulfuric acid will be stored in a 7,500-gallon lined and coated, steel, above ground, horizontally mounted tank, with a secondary containment wall surrounding it that is capable of holding the full contents of the tank plus 10%. The applicant has stated that these tanks will be separated by a significant distance, however, figure 3.5-1 (LPGP 1998a, AFC page 3.5-6) shows these tanks located next to each other. It is staff's opinion that 100 feet is a reasonable, safe and achievable separation distance. The applicant has agreed to incorporate this feature into the plant design.

Delivery of sodium hypochlorite and sulfuric acid will not occur at the same time. Both storage tanks will have separate loading hose connections, values, pumps and piping. Tag and lockout procedures will be implemented along with facility staff oversight. Facility staff who will be overseeing the deliveries of these chemicals will receive training regarding their incompatibilities and the hazards of mixing them.

FIRE AND EXPLOSION FROM THE USE OF NATURAL GAS

Natural gas, which will be used as fuel for the facility, poses a fire and/or explosion risk as a result of its flammability. While natural gas will be used in significant quantities, it will not be stored on-site. The risk of a fire and/or explosion will be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. National Fire Protection Association 85A requires; 1) the use of double block and bleed valves for gas shut-off, 2) automated combustion controls, and 3) burner management systems. These measures will significantly reduce the likelihood of an explosion in the heat recovery steam generators. Additionally, start-up procedures will require air purging of gas turbines and fireboxes prior to start-up to preclude the presence of an explosive mixture.

MITIGATION

ACCIDENTAL RELEASE OF AMMONIA GAS

~~Given the proposed delivery, storage and safety controls for aqueous ammonia, staff recommends no further mitigation.~~ The applicant has proposed the use of aqueous ammonia as a substitute for the much more hazardous anhydrous ammonia. The aqueous ammonia storage facility will consist of a delivery truck bay and an ammonia storage building. The delivery truck bay will be open on three sides with a roof covering it. The floor will be sub graded and sloped towards the ammonia storage building. The tank storage building will include drains at the truck bay so that any ammonia or water spilled in the truck bay will drain into the ammonia storage building. An automated spill sensor and water sprinkler system will be incorporated into the roof of the truck bay to wash down any spills in the truck bay.

The tank storage building will have three or four 13,280-gallon, vertically mounted, aqueous ammonia storage tanks designed to Seismic Zone 4 specifications. The building will include a sub graded area that will have a capacity of 30,000 gallons (for three tanks) or 34,500 gallons (for four tanks) to provide overfill, truck bay spillage and tank rupture protection. The building will enclose the tanks on all four sides, as well as the necessary pumps for loading and handling the aqueous ammonia. The building will also include roof vents and air intake vents (located near ground level along the back wall), as well as a separate electrical control room. An automated spill sensor system will trigger all vents in the building to close, effectively reducing the ammonia emissions during an accidental spill to zero. Figure 1-1 of the addendum to the AFC shows the layout and dimensions of the four-API tank design proposal (LPGP 1998a, Addendum VI).

Staff has proposed a Condition of Certification to ensure that the facility will be designed and constructed as proposed prior to the handling of these materials at the facility (see **HAZ-4** and Appendix C).

In addition, the applicant will prepare a Business Plan and a Risk Management Plan as required by the California Health and Safety Code (see the Compliance with Laws, Ordinances, Regulations and Standards section of staff's analysis). Staff and the local Administering Agency will review and approve these plans prior to handling of these materials at the facility (see proposed Conditions of Certification **HAZ-2** and **HAZ-3**).

Staff has also proposed a Condition of Certification to require the development of a Safety Management Plan, which will address in detail delivery procedures, training of personnel, define responsibilities of personnel and management, maintenance procedures, labeling and many other aspects of safety management practices applicable to handling of hazardous materials at the facility. Staff will review and approve this plan prior to handling of hazardous materials at the facility. This plan will be reviewed based on the Guidelines for Technical Management of Chemical Process Safety established by the AIChE (see **HAZ-3**).

CHLORINE AND HYDROGEN GAS RELEASE

~~Given the proposed delivery, storage and safety precautions for both sodium hypochlorite and sulfuric acid, staff recommends no further mitigation~~. Sodium hypochlorite will be used to treat water to control the growth of algae and other biological agents and to control pH. Staff supports the use of this material in that it poses much less risk than use of anhydrous chlorine, which is more commonly used for this purpose. Sulfuric acid will be used to control pH levels in the cooling tower and feed water. To avoid accidental release of chlorine or hydrogen as a result of the accidental mixing of sodium hypochlorite with sulfuric acid, the applicant has proposed several mitigation measures.

Sodium hypochlorite will be stored in a 5,000-gallon plastic, above ground, vertically mounted storage tank, with a secondary containment wall surrounding it that is capable of holding the full contents of the tank plus 10%. The sulfuric acid will be stored in a 7,500-gallon lined and coated, steel, above ground, horizontally mounted tank, with a secondary containment wall surrounding it that is capable of holding the full contents of the tank plus 10%. The applicant has stated that these tanks will be separated by a significant distance, however, figure 3.5-1 (LPGP 1998a, AFC page 3.5-6) shows these tank located next to each other. It is staff's opinion that 100 feet is a reasonable, safe and achievable distance of separation.

Delivery of sodium hypochlorite and sulfuric acid will not occur at the same time. Both storage tanks will have unique loading hose connections and separate valves, pumps and piping. Loading connections will be locked and controlled by facility personnel. Loading procedures will be implemented and facility staff will oversee all loading of these materials. Facility staff responsible for overseeing the deliveries of these chemicals will receive training regarding the incompatibilities and the hazards associated with such mixing (AFC Section 5.15.2.2.6 and Docket Log Number 10923).

Staff has also proposed a Condition of Certification to require the preparation and implementation of a detailed Safety Management Plan. This plan will address all of the features for the sodium hypochlorite and sulfuric acid handling described above and will also address procedures to avoid accidental mixing of these materials, as well as design of loading fixtures to preclude accidental loading of either material into the wrong tank (see **HAZ-3**).

FIRE AND EXPLOSION FROM THE USE OF NATURAL GAS

~~Given the proposed controls for the use of natural gas, staff recommends no further mitigation.~~ Natural gas, which will be used as fuel for the facility, poses a fire and/or explosion risk as a result of its flammability. While natural gas will be used in significant quantities, it will not be stored on-site. The risk of a fire and/or explosion will be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. National Fire Protection Association 8501 requires; 1) the use of double block and bleed valves for gas shut-off, 2) automated combustion controls, and 3) burner management systems. These measures will significantly reduce the likelihood of an explosion in the heat recovery steam generators (HRSG).

Additionally, start-up procedures will require air purging of gas turbines and fireboxes prior to start-up to preclude the presence of an explosive mixture. Detailed procedures to address explosion in the HRSG will also be included in the Safety Management Plan (see **HAZ-3**). Staff will review and approve these procedures prior to operation of the generating equipment. (See AFC Section 7.4.)

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The applicant will comply with all LORS requirements by developing a Business Plan, a Risk Management Plan and a Safety Management Plan (described below), as well as designing and constructing the proposed power plant to Seismic Zone 4 specifications.

The Business Plan (Health & Safety Code § 25500 et seq.) will include the basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidentally released into the environment. It must also include a plan for training new personnel and for annual training of all personnel in safety procedures to follow in the event of a release of hazardous materials. It must include an Emergency Response Plan and identify the business representative able to assist emergency personnel in the event of a release.

The Risk Management Plan (Health & Safety Code § 25531 et seq.) will identify the severity of an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material.

The Safety Management Plan (Title 8, California Code of Regulations), which focuses on the delivery and handling of the identified hazardous materials, should identify management personnel (by job title) who are responsible for developing and implementing the identified safety procedures, and the safety procedures themselves. The plan will include how the applicant will motivate its employees to accomplish safety objectives, and detailed procedures used to address the hazards associated with human error during storage and transfer of hazardous materials.

CUMULATIVE IMPACTS

A cumulative impacts analysis is an analysis of a particular project viewed over time and in conjunction with other related past, present and reasonably foreseeable future projects whose impacts might compound or interrelate with those of the project at hand. To be adequate, the cumulative impacts analysis must include the following elements:

3. Either:
    a) a list of past, present and reasonably foreseeable future projects, or

b) a summary of projections contained in the adopted general plan or planning document that is designed to evaluate regional or area-wide conditions.

1. A summary of such individual projects' expected environmental impacts.
2. A reasonable analysis of all projects' cumulative impacts.

The discussion of cumulative impacts for the accidental release of hazardous materials centers around the increase in risk to the public health and safety. Each facility that handles hazardous materials increases the risk to the public health and safety by a small amount. Taken together, those increased risks could be significant.

The area in which the project is located is heavily industrialized. Significant amounts of hazardous materials are transported, stored and used in the area of the western Kern County oil fields. There are expected to be four additional power plant projects in western Kern County. They will all be required to store and use ammonia for purposes of control of nitrogen oxides. Two of the four power plant projects will be storing anhydrous ammonia (instead of aqueous ammonia). This means that they might have more severe off-site impacts than a project using aqueous ammonia. The other two projects have not submitted AFCs to the Energy Commission at this time. There might be as many as four power plant projects in western Kern County that could have significant potential for off-site impacts, which could result in a significant cumulative impact.

However, the IMPACTS ANALYSIS section of this testimony demonstrates that there will be no potential for significant off-site impacts on the public health and safety from the hazardous materials handled at the LPGP facility. Therefore, there is no significant cumulative impact associated with the LPGP project.

FACILITY CLOSURE

The project will eventually be closed. A power plant is typically intended to serve for twenty, thirty or forty years. At the end of that lifespan, a planned closure typically occurs, under which the facility is decommissioned in an orderly manner. Natural disasters, such as an earthquake or severe storm, and economic emergencies, such as loss of a fuel supply contract or power sales contract, can cause an unexpected temporary shutdown of the project. If damage to the project is too great, or if the economic problems cannot be solved, the unexpected shutdown may become permanent.

In each of these shutdown scenarios, it is imperative that hazardous materials stored onsite be managed safely. In the Facility Closure portion of the **General Conditions** section of this document, requirements are delineated that will require the project owner to submit to the CPM a Facility Closure Plan in the event of a planned closure of the facility. In addition, the General Conditions section requires the project owner to submit to the CPM, before commercial operation commences, On-site Contingency Plans that address how the hazardous materials will be managed in the event of an unexpected temporary or permanent closure. In order to ensure that hazardous materials are

managed safely, the following provisions should be included in the Facility Closure Plan and the On-site Contingency Plan:

- In the case of a planned closure or an unexpected permanent closure, any hazardous materials present shall be removed from the site in accordance with all applicable LORS. One way of accomplishing this may be for the project owner to include, in its contracts with hazardous materials suppliers, a requirement that the supplier remove the materials if requested to do so by the project owner or any competent authority.
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- In the case of an unexpected temporary closure, the On-site Contingency Plan shall address how the site and the hazardous materials will be managed safely for the period of closure. Should the temporary closure be declared permanent by the CPM, any hazardous materials present shall be removed from the site in accordance with all applicable LORS.

The above requirements should serve as adequate protection, even in the unlikely event of project abandonment. To ensure that these measures are included in the Facility Closure Plan and the On-site Contingency Plan, a Condition of Certification (HAZ-5) is proposed, below.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff concludes that the proposed handling of hazardous materials at the project site will comply with applicable LORS and will not result in a significant risk to public health. Staff proposes the following conditions of certification to ensure that the applicant performs all mitigation measures as proposed in the AFC.

The design and operation of the proposed project with adoption of staff's proposed conditions of certification will comply with all applicable LORS. The applicant will be required to submit a Business Plan and a Risk Management Plan to the Kern County Fire Department (KCFD). The KCFD will evaluate the proposed hazardous materials storage and handling systems and the risk assessment provided by the applicant and indicate whether they are satisfied with the proposed facilities.

RECOMMENDATIONS

Energy Commission staff recommends that the proposed conditions of certification presented herein be adopted by the Energy Commission to ensure that the project is designed, constructed and operated to protect public health and safety and to comply with applicable LORS. To insure adequacy of the Business Plan and Risk Management Plan, Energy Commission staff recommends that these plans be submitted to the Energy Commission Compliance Project Manager (CPM) for review, and to the KCFD for review and approval, prior to the delivery of any hazardous materials to the facility.

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous material in reportable quantities that is not listed in Appendix B, unless approved by the CPM.

Verification: The project owner shall provide in the Annual Compliance Report a list of hazardous materials used at the facility in reportable quantities.

HAZ-2 The project owner shall submit both the Business Plan and Risk Management Plan to the CPM for review and comment, and shall also submit these plans and/or procedures to the Kern County Fire Department for approval.

Verification: At least sixty (60) days prior to the initial delivery of any hazardous materials in reportable quantities to the facility, the project owner shall submit the Business Plan and Risk Management Plan to the CPM for review and comment. At the same time, the project owner shall submit these plans to the Kern County Fire Department for approval. The project owner shall also submit evidence to the CPM of the Kern County Fire Department approvals of these plans when available.

HAZ-3 The project owner shall provide a detailed Safety Management Plan (SMP) to the CPM for approval and review.

Protocol: The Safety Management Plan shall include the following: 1) a description of how each element of the SMP applies to the proposed facility; 2) an explicit chain of command (by job title on final organization chart) for each specific objective identified in the plan (for example, under "Accountability," list who will be responsible for the preparation of the specific statement of expectations, objectives and goals by senior management, daily shift logs and reports of abnormal conditions); 3) a description of how corporate management will ensure proper implementation of the SMP and ensure that production and safety are properly balanced; 4) methods that will be used to motivate employees to accomplish safety objectives; and 5) detailed procedures to address the hazards associated with human error during storage and transfer of hazardous materials.

Verification: At least sixty (60) days prior to the initial delivery of any hazardous materials in reportable quantities to the facility, the project owner shall provide a detailed Safety Management Plan as described in the Protocol section of this Condition of Certification to the CPM for review and approval.

HAZ-4 The project owner shall design and build the aqueous ammonia storage facility as described in Appendix C:

Verification: At least sixty (60) days prior to the delivery of aqueous ammonia, the project owner shall provide detailed designs for the aqueous ammonia storage facility to the CPM for review and comment.

HAZ-5 Prior to commencement of commercial operation, the project owner shall submit to the CPM for review and approval hazardous materials management plans as described below. These plans may be incorporated into the Facility Closure Plan and the On-site Contingency Plans (which are required under General Conditions).

Protocol: For the event of a planned closure or an unexpected permanent closure of the facility, the On-site Contingency Plan (and the Facility Closure Plan, should one be submitted) shall address how all hazardous materials will be removed from the site in accordance with all applicable LORS.

Protocol: For the event of an unexpected temporary closure of the facility, the On-site Contingency Plan shall address how the site and the hazardous materials will be secured and maintained safely for the period of closure. For the event in which the temporary closure is declared permanent by the CPM, the On-site Contingency Plan shall address how all hazardous materials will be removed from the site in accordance with all applicable LORS.

Verification: At least 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation, the project owner shall submit the above plans to the CPM for review and approval.

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APPENDIX A

BASIS FOR USE OF 75 PPM AMMONIA EXPOSURE CRITERIA

Staff uses a criterion of 75 ppm to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this criterion is not consistent with the 200 ppm criterion used by EPA and Cal EPA in evaluating such releases pursuant the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's CEQA analysis. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices are implemented and actions are taken in response to accidental releases. However, the regulations implementing these programs do not provide clear design changes or other major changes to a proposed facility.

The preface to the Emergency Response Planning Guidelines (ERPGs) states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to adult healthy individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations) they are not appropriate and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. CEQA requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through changes to the proposed project.

Staff has chosen to use the National Research Council's 30 minute Short Term Public Emergency Limits (STPELs) to determine the potential for significant impact. These limits are designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at these levels should not result in "serious sequelae" but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures of the general public to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events, and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL.

ACUTE AMMONIA EXPOSURE GUIDELINES

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 min.	Exposure above this level requires the use of "highly reliable" respiratory protection and poses the risk of death, serious irreversible injury or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 min.	Protects nearly all segments of general population from irreversible effects
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 min. 4 times per 8 hr day	No toxicity, including avoidance of irritation
EEGL[3]	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 min.	Significant irritation but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one time exposure
STPEL[4]	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 min. 30 min. 10 min.	Significant irritation but protect nearly all segments of general population from irreversible acute or latent effects. One time accidental exposure
TWA[2]	NIOSH	Adult healthy male workers	25 ppm	8 hr.	No toxicity or irritation on continuous exposure for repeated 8 hr. work shifts
ERPG-2[5]	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 min.	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin)

1. (EPA 1987) 2.(NIOSH 1994) 3.(NRC 1985) 4. (NRC 1972) 5. (AIHA 1989)

* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.

** The (NRC 1979) describes a study involving young animals which suggests greater sensitivity to acute exposure in young animals. The (WHO 1986) warns that the young, elderly, asthmatics, those with bronchitis and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

APPENDIX A - REFERENCES

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APPENDIX A - ABBREVIATIONS

ACGIH	American Conference of Governmental and Industrial Hygienists
AIHA	American Industrial Hygienists Association
EEGL	Emergency Exposure Guidance Level
EPA	Environmental Protection Agency
ERPG	Emergency Response Planning Guidelines
IDLH	Immediately Dangerous to Life and Health Level
NIOSH	National Institute of Occupational Health and Safety
NRC	National Research Council
STEL	Short Term Exposure Limit
STPEL	Short Term Public Emergency Limit
TLV	Threshold Limit Value
WHO	World Health Organization

APPENDIX B

HAZARDOUS MATERIALS TO BE USED AND STORED ON-SITE AT THE LA PALOMA GENERATING PROJECT

Chemical	Purpose	Storage Type	Storage Quantity	
			Usage/ Day	Maximum Amount Stored
Sulfuric acid (93%)	Circulating water treatment	Tank, lined C.S.	3,900 lbs	7,500 gal
Neutralizing amine solution	Feedwater pH control	Portable vessel	10 lbs	800 gal
Oxygen scavenger solution	Feedwater oxygen control	Portable vessel	5 lbs	800 gal
Di-, tri-sodium phospate solution	Boiler water pH/scale control	Portable vessel	10 lbs	800 gal
Aqueous ammonia (~30%)	NOx emission control	Tank, C.S.	3,000 gal	53,120 gal
Sodium hypochlorite (12%)	Biocide for condenser cooling water system, water treatment	Tank, plastic	1,200 lb	5,000 gal
Hydrochloric acid	Chemical cleaning of HRSG	Portable vessel	As needed	Temporary only
Ammonium bifluoride	Chemical cleaning of HRSG	Portable vessel	As needed	Temporary only
Citric acid	Chemical cleaning of HRSG, feedwater systems	Portable vessel	As needed	Temporary only
EDTA Chelant	Chemical cleaning of HRSG, feedwater systems	Portable vessel	As needed	Temporary only
Sodium nitrate	Chemical cleaning of HRSG	Portable vessel	As needed	Temporary only
Scale inhibitors	Control scale in circulating water system	Portable vessel	65 gal	2,000 gal
Polymer	Water treatment coagulant aid	Portable vessel	70 lbs	800 gal
Alum, aluminum sulfate, liquid (45%)	Water treatment coagulant	Tank, plastic	500 gal	10,000 gal
Diesel fuel oil	Diesel fire pump	Tank, UL C.S.	0	100 gal
Sulfuric acid for station batteries	Electrical/control building Combustion turbine Misc.	Battery	0	1,200 gal 1,464 gal 200 gal
Hydrogen	Generator Cooling	Tank, C.S	1,600 cf	120,000 cf

Source: LPGP 1998a, AFC Tables 3.4-6

APPENDIX C

FACILITY DESIGN*

A combined delivery and storage facility will be constructed. The proposed facility consists of an adjoining truck delivery bay and enclosed aqueous ammonia storage building. The truck delivery bay will be open on three sides, and will have a roof that will limit rain (or solar radiation) on the bay floor. This sub-grade delivery bay floor will be sloped to contain and drain any accidental ammonia spill during delivery and offloading. A water sprinkler system above the bay will dilute and wash any spills. Spills will flow quickly through drain slots into a large sub-grade containment area in the ammonia storage building, which will have enough capacity to hold the entire contents of an 8,000-gallon truck tank, plus spray water.

La Paloma Generating Company, LLC, is considering two facility layout options. Both options utilize the same design and safety concepts and have nearly identical layouts; the key differences being the number of ammonia storage tanks and the length of the building and delivery pad. The two options for the enclosed ammonia storage building are:

- Four 13,280-gallon storage tanks with a sub-grade spill basin capacity of approximately 34,500 gallons (excluding the volume occupied by the four tanks). This is enough capacity to hold all plausible tank overfill, tank rupture and delivery truck spill scenarios. The four-tank option has a larger (longer) building and truck pad than the following three-tank option, and is therefore used as a worst-case scenario from the standpoint of ammonia vapor emissions for the off-site consequence analysis provided in this submittal.
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- Three 13,280-gallon storage tanks. In this case, the storage building's basin will have an approximate capacity of 30,000 gallons (excluding the volume occupied by the three tanks), which would also be enough capacity to hold all plausible spill scenarios.
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HAZARDOUS MATERIALS HANDLING Figure 1 shows the layout and dimensions of the four-tank option. The layout for a three-tank option would be essentially the same, with a shorter storage building and truck bay.

* Adapted from La Paloma Generating Company, LLC, data request response of February 10, 1999.

HAZARDOUS MATERIAL HANDLING Figure 1